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Photo shows Dr. (Srimathi) H. M. Sharma, Director of Public Health, addressing the Health Inspectors of Tirunelveli district, on the follow up work to be carried out in N.S.E.P.

Photo in the left is of the same occasion shows the Assistant Director in charge of S.E.P. in our State addressing the gathering.

" WORLD PROBLEM "

" The global eradication of smallpox is well within the bounds of possibility. The only reservoir is man; infection is manifest; carriers do not exist, and successful vaccination provides effective immunity. Eradication of smallpox is a matter of concern to all countries as those now free constantly run the risk of the introduction of the infection from endemic areas."

[The verdict of World Health *Organisation* Expert Committee on Smallpox, which met in Geneva, during January '64.]

Smallpox
— Challenge and Answer

DR. SUSHILA NAYYAR

MEDICAL events in the last century have shown that no country can remain free from deadly communicable diseases until they are eradicated from other countries also. Different countries of the world have, therefore, embarked upon international co-operation in the field of health. This international co-operation gradually grew into the formation of the World Health Organization was adopted on 7th April 18 years ago. To commemorate that Day, we celebrate the World Health Day every year and pledge again for international co-operation in the field of health. For some years, this memorable Day of international co-operation is being used to focus the attention on one of the diseases which is harming mankind. This year's theme of World Health Day is connected with the eradication of smallpox. The slogan is : " Smallpox—Constant Alert ".

Smallpox is a dreaded infectious disease, which affects people indiscriminately in any part of the world. Every country is making efforts to prevent and ultimately eradicate it. As long as smallpox persits in any part of the world, preventive measures against it all over the world have got to be taken.

About 160 years back, vaccination for the prevention of smallpox was discovered, but we have failed to make the best use of this effective weapon. Even now, every year more than a lakh of people in the world fall a prey to smallpox and about 25,000 of them die. Therefore we have to take a pledge today that we will be on the alert and see that we don't fall a victim to or die of smallpox—a preventible disease which can be easily controlled. To fulfil this pledge, Science has

given us an easy and simple method—*Vaccination*. If all the people of the world get themselves vaccinated and re-vaccinated periodically, they will not suffer from smallpox. The pledge should be that none among us will be left unvaccinated.

The incidence of smallpox in India is the largest when compared to that of other countries. In the course of the last five years, about four lakh people suffered from it all over the world and about 88,000 of them died. Out of these, in India alone, 250,000 suffered and 70,000 succumbed to it during the course of five years. Though the means to get rid of this disease are available easily and free of cost, it is really sad that this disease takes a toll of thousands of lives every year. Not only this, even those who survive generally become blind, deaf, pock-marked or handicapped in some way or the other and thus become a burden for themselves and the society. The disfigured pock-marked youth finds his future prospects dark and the life of young girls with pock-marks or blinded as a result of smallpox is ruined. Did you ever imagine the dreadful and dangerous consequences of this disease? Had you ever thought of the serious consequences of this problem. it should have been solved long ago.

On visualizing the serious situation of smallpox in India, the Central Government embarked upon the National Smallpox Eradication Programme in 1962. Under this programme, 155 Smallpox Eradication Units are now working in the country. Uptill now, in 144 districts of the country vaccination work has been completed and the vaccination coverage extended to nearly 70 per cent of the population, but the problem of smallpox still continues to be serious in certain places. It would have been all the more serious had we not launched the eradication programme. As a result of mass vaccination under this programme, there has been a considerable decrease, as compared to previous years, in the incidence of smallpox. The year 1963–64 happened to be cyclic year for the epidemic. In the seven months (November to May) of

the year about 26,000 suffered from smallpox and about 7,000 of them died, whereas in the same period in 1950–51 and 1957–58, the years of cyclic epidemic, nearly 250,000 and 150,000 suffered from smallpox and out of them about 57,000 and 36,000 respectively died. In other words if 100 died in 1950–51, the number of deaths on account of smallpox were 65 in 1957–58 and 13 in 1963–64, the years of cyclic epidemic —that is death rate from smallpox in the cyclic year 1963–64 fell down by 81 per cent when compared to the death rate in the cyclic year 1957–58. The mass vaccination campaign has no doubt considerably brought down the number of cases of smallpox but we should not be satisfied with this only. We should be content only when smallpox is totally wiped out from our country and there is not a single person suffering from it.

Is it possible that there may not be a single case of death due to smallpox in our country? Yes. It can surely be. Smallpox has vanished from many of the countries of the world. Not only in U.S.A. or Europe, but even in some countries of Africa and Asia, smallpox has become a thing of the past. When there could be complete eradication of small-pox from these countries, why couldn't it be so in our country? Perhaps, you may think that it is due to the climate that there is no incidence in those countries. This is a mis-understanding. Climate has nothing to do with outbreaks of smallpox. Today, hardly one or two persons may suffer from smallpox in those countries where 150 years ago, thousands of people died of smallpox. And this too happens only when infection is carried to their country from endemic areas.

The other misunderstanding that prevails is that if the house is a big one and kept clean, there would be no incidence of smallpox. History would bear it out that even great kings and emperors were the victims of smallpox. This was the disease that lost Maharaja Ranjit Singh his one eye. Very recently in our country one of the popular filmstars suffered from smallpox and died.

Why then even today there is very high incidence of smallpox in our country? Because even now we believe in age-old superstitions and traditions. I do not want to hurt the beliefs and ideas of any one; rather I respect the religious beliefs. What I humbly want to request is that you can stick to your religious beliefs but accept vaccination also because it is for your good. Through vaccination alone a number of countries in the world have attained freedom from smallpox. They too might have beliefs and ideas when they went in for vaccination, but when they witnessed the results and had the proof of the efficacy of vaccination, they accepted it and got rid of smallpox. We too have to act in the same way.

I appeal to you on this World Health Day to realize the danger of smallpox and make a success of the National Smallpox Eradication Programme presently going on in our country. Give your fullest co-operation to the vaccination teams when they visit your village, neighbourhood or your house. Get yourself and your family vaccinated and make sure that no one is left unvaccinated in your neighbourhood, society or your village. If someone remains unvaccinated in your family, neighbourhood, society or village, this would give room for occurrence of smallpox.

Remember, there should be no one left in any part of our country without being vaccinated. The facilities for vaccination are today available free of cost in hospitals and vaccination centres, and vaccinators are going from door to door. I wish, on this World Health Day, you too should join hands with the people of other countries in taking a pledge of completely exterminating smallpox.

***Courtesy*: " *Swasth Hind* ", *WHO Day Number*, '65.**

How to Prevent Everybody From Smallpox?

Dr. M. G. Candau, Director-General of WHO, described smallpox as " a burden which in the light of our knowledge is a complete anachronism ". The means of preventing smallpox have in fact been known since the end of the 18th century, but this disease is still endemic in many countries in Asia and Africa. In South America it is not yet completely eliminated. The prevention of smallpox presents no medical mystery. No complex change confuses the transmission of the disease. No animal or parasite carries the virus. Man alone harbours it.

In 1958, WHO set itself to banishing the disease and started to collect all possible information and give guidance in answer to requests from Governments. It established basic principals to be applied in every country and at all stages of an eradication campaign. The aim of a national campaign should be to vaccinate 100 per cent of the population.

The WHO procedure consists of three phases—

(1) Preparatory.

(2) Attack.

(3) Control.

The preparatory phase covers collection of data and assessment of social and economic conditions.

Staff is recruited and trained. Arrangements are made for an adequate supply of freeze-dried vaccine.

The attack phase is the main part of the campaign. The aim is to vaccinate the entire population in the shortest possible time and in any case within three years. Special

attention should be paid to priority groups, infants for example, and to priority areas, densely populated districts for example, or centres frequented by travellers from neighbouring infected countries.

The control phase will last for some years after the attack phase is completed. In this phase, each outbreak of smallpox must be carefully followed up and main activities will include the vaccination of immigrants and floating population.

Successful national smallpox control may be said to have been achieved if no indigenous disease has occurred for three successive years and if such local outbreaks as may have occurred from imported cases have been radically controlled.

To enable WHO to offer assistance over and above its regular budget, the World Health Assembly established the Voluntary Fund for Health Promotion, which includes a Special Account for Smallpox Eradication. This account is used for the supply of freeze-dried vaccine, for laboratory and refrigeration equipment and for transport vehicles. The most prominent need is for freeze-dried vaccine. Without donations to the WHO Special Account, much of what has already been achieved would have been impossible. Contributions to WHO's Special Account for Smallpox Eradication can be made in cash—in any usable currency—or in the form of services, supplies, equipment and vehicles.

***Courtesy* : " *World Health* ".**

What is N. S. E. P.?

This article deals with the planning, organization and execution of the National Smallpox Eradication Programme in India. The staffing pattern of units engaged in eradication, complications observed during the course of implementa tion, the lacunae discovered during simultaneous assessment and evaluation and the success rate, both in primary vaccinations, and revaccinations, as well as the number inspected, have also been highlighted.

—Editor.

Planning and Organization

The Government of India, Ministry of Health, taking note of the periodicity with which epidemics of smallpox were occurring in the country, appointed a central expert committee in May 1958, under the auspices of the Indian Council of Medical Research, to examine the question of smallpox in all its aspects and to suggest ways and means for its eradication. This Central Committee, in collaboration with similar committees formed under instructions from the Centre in the constituent States of the country, examined the problem and brought out a report on its deliberations in June 1959, making specific recommendations that steps should be taken to launch, with the least possible delay, a National Smallpox Eradication Programme in the country, with the avowed object of successfully vaccinating the entire population as far as practicable and completing the programme within a period of three years. This necessitated a concerted and simultaneous action in all States of India.

The Committee further recommended that, in order to attain this object, immediate action should be taken, as follows :—

(1) To ensure availability of adequate supplies of potent vaccine lypmh; (2) To recruit and train adequate numbers of vaccinators and other personnal required for the campaign, (3) To obtain the necessary equipment for vaccination work and storage of vaccine lymph at all levels: (4) To bring into being a suitable organization, both at the centre and in the States to ensure the smooth functioning of the campaign and, above all; (5) To prepare the population well in advance to receive the programme as outlined.

The Central Expert Committee also recommended the initiation of pilot projects in one district of each State in order to work out the methodology for the eradication programme and to gather first-hand experience of the difficulties that might be encountered during the course of mass vaccination drives and how to overcome them as well as to collect data for estimating the requirements in personnel and finances for the country-wide eradication programme.

As a sequel to the above recommendation, pilot projects were started in October/November 1960 in one district in each State and in the Union Territory of Delhi, and out of approximately 23 million people in these areas in which pilot projects were carried out, 14.4 million were contacted and over 12 million vaccinated up to 31st March 1961. Liquid lymph vaccine, after proper transport and storage, was used in the pilot projects in all States except for Orissa (where freeze-dried vaccine donated by the Netherlands Government and made available by WHO was used).

The Government of India accepted the recommendations of the Central Expert Committee and those contained in the

Pilot Project Committee's report (submitted after the termination of the pilot projects in October 1961), and decided to embark on the National Smallpox Eradication Programme during the Third Five-Year Plan period.

In January 1962, the Ministry of Health sanctioned a sum of 6.89 million rupees for launching a nation-wide programme, and indicated in their instructions to all State Governments that the implementation of this programme would necessitate—

(1) Setting up a central organisation at Delhi in the Directorate-General of Health Services under the overall charge of a Deputy Director-General of Health Services, for co-ordination, etc., of the programme;

(2) Setting up a headquarters organization in each State, under an Assistant Director of Health Services, to be in full charge of operations at the State level;

(3) Setting up district organizations in each State for the execution of mass vaccination campaigns, e.g., the appointment of supervising medical officer, health educators, vaccinators, inspections and ancillary staff;

(4) Procurement of equipment such as vehicles, lancets, sterilizing sets, refrigerators, etc.

(5) Provision of adequate supplies of potent smallpox vaccine.

It was envisaged in these instructions that the mass vaccination campaign, if properly organized by the State Governments, could be completed in their respective States in two phases, viz., covering half the districts/areas in each State by mass vaccination in first phase and covering the remaining districts/areas of each State by a mass vaccination campaign in second phase. Thus the same staff and equipment could be utilized for the campaign in its two phases.

Simultaneously instructions were also conveyed that, for the implementation of this National Smallpox Eradication Programme, a suitable organization should be immediately

set up at each state headquarters for proper planning, supervision, co-ordination and evaluation of results. These organizations will have to be set up by the State Governments immediately and continued for a period of about three years.

— The staffing pattern per unit, as per the recommendation of the Smallpox Pilot Project Committee, was also indicated to all State Governments along with the financial implications. The pattern of central assistance to State Governments for the execution of the National Smallpox Eradication Programme was given as being 100 per cent assistance for all non-recurring items of expenditure and 75 per cent for all expenditures of a recurring nature. With detailed instructions conveyed in January 1962 to each State Government, it was also suggested in connection with the launching and implementation of the programme, that—

(1) They should select areas for the execution of the mass vaccination campaign in each of two phases of the National Smallpox Eradication Programme period;

(2) Each State should aim at a target of 100 vaccinations per vaccinator per day, except in hilly areas, where a lower figure might be adopted;

(3) Complete units should be raised before sending them out into the field, and a quarterly report of the progress of the programme should be sent to the Ministry.

Launching of the Programme

The National Smallpox Eradication Programme was actually launched in a majority of the States, with the full number of sanctioned units, in October/November 1962, with the exception of Mysore State, which started to implement the obligations of the programme from February 1962, and Punjab and Gujarat States, which embarked on the programme in May and July 1962, respectively. Two States viz., Rajasthan and Madras, due to late sanction by the respective State Governments, started the programme only in the middle of January and March 1963, respectively. The

total number of units working in the whole country is 150, and out of a total population of 438 million people (according to the 1961 census), nearly 171.71 million have been protected, that is, 39.2 per cent of the total population stands vaccinated.

The progress of the programme in each State has not been uniform. Jammu and Kashmir, Punjab and Mysore have covered by now, 77.3 per cent, 76 per cent and 67 per cent of their populations respectively. The coverage in other States varies between 27 and 46 per cent.

Potency Testing of Vaccines

Col. S. L. Kalra, Professor of Microbiology at the All-India Institute of Medical Sciences, New Delhi, has been entrusted with the testing of vaccines, both freeze-dried and liquid lymph for microbial purity and also for potency on fertile eggs.

Targets

Our targets are that the attack phase of the programme, including mopping-up operations, to achieve more than 90 per cent coverage of all sections of populations in each State, should be completed by March 1965. After this is achieved the obligations of the maintenance phase will be taken up i.e., vaccination of all newborns, revaccination at the ages of 5, 10 and 15, and mass vaccination of all contacts on the occurrence of sporadic cases of smallpox).

It is proposed to entrust the obligations of the maintenance phase to the existing normal health services operating in the country by suitably augmenting their present inadequate staff.

Three Essential Fundamentals

For the ultimate success of the eradication programme, three basic factors have been kept in view, viz :—

(1) The availability of a potent and heat stable vaccine for use in the field.

(2) The existence of a devoted public health organization with staff trained to vaccinate the people entrusted to their care and to exercise constant supervision over the Vaccinators' work so that no lacunae may remain in either the enumeration of population or the recording of results.

(3) The co-operation of the people; For the success of such a gigantic public health programme, it is necessary that all sections of the public should realize that vaccination is for their own good and that untold suffering and misery can be avoided if everyone gets himself or herself vaccinated. To make people accept vaccination, health education work, properly conducted, should precede the mass vaccination drive and should be continued, if possible, even during the mopping-up and maintenance phase.

Complications Reported during the Mass Vaccination Campaign

We have by now vaccinated 196 million people, but the complications with (symptomology simulating post-vaccinal encephalitis, including the menmgenial syndrome) have only been reported in fifteen cases in different parts of the country; six of these were fatal. A few cases of generalized vaccinia were reported, as well some cases of tetanus, due probably to the application of extraneous matter at the vaccination site by relations.

Repetition of Mass Vaccination Programmes

Although Madras City, along with Chingleput district, had been included in the pilot project, and nearly 61 per cent of the population there was reported to have been covered in 1961, there were 1,571 cases with 306 deaths reported from this area during 1962, and during 1963 up to 31st October as many as 2,053 with 488 deaths. Liquid lymph vaccine from the King Institute, Guindy, was used in the city of Madras, both during and following the pilot project. It was noted that 53 per cent of the cases occurred among the unvaccinated group.

The whole mass vaccination programme is being repeated this time with freeze-dried vaccine. Similarly, a mass vaccination programme in Calcutta has been undertaken, at the insistence of the Centre, with freeze-dried smallpox vaccine.

Assessment and Evaluation of the Programme

The Smallpox Eradication Programme carried out in the Union Territory of Delhi was subjected to an independent assessment and evaluation by a special committee in March 1963. Representatives from the World Health Organization and the USAID were associated with the work of this Committee. The Committee brought out its report in May 1963, highlighting the lacunae responsible for the continuance of the epidemic conditions in Delhi and the recommendations of that Committee are under implementation. In September 1963 the National Institute of Communicable Diseases of Delhi was entrusted with the assessment and evaluation of the programme in eight districts in different parts of the country, where, by then, more than 80 per cent coverage of the population in those respective areas had been attained. By now, the assessment has been carried out in three districts in different States (Mysore District in Mysore State, Palghat District in Kerala State, and Chingleput District in Madras State). Two of the reports received so far have revealed that a large percentage of smallpox cases occurred among the unvaccinated population, particularly those belonging to the vulnerable age-group, i.e., under five years of age. Some other important findings as a result of these independent assessments serve as good pointers for remedying the defects in the programme to achieve the ultimate objective of eradication.

Co-ordination of the Programme

The Deputy Director-General of Health Services in-charge of the Smallpox Eradication Programme at the Centre regularly visits the States and Union Territories to acquaint himself first hand with the progress of the programme. He also goes out into the field to see the vaccination teams in actual

operaion, checks the vaccinial status of the populaton covered and sends out regular tour notes after visiting the States so that the deficiencies noted may be remedied by the respective State Governments. The Union Health Minister and the Secretary of the Ministry of Health, Government of India during their visits to different States, are supplied with detailed information about the progress of the programme in each State so that they may take up at the Government level any deficiencies and lacunae, with a view to remedying them without delay.

The Regional Deputy Directors in-charge of the National Malaria Eradication Programme, during their visits to areas where malaria eradication operations are going on, also collect information on the progress of the National Smallpox Eradication Programme and give this to Centre. Also if the surveillance workers in Malaria Organization, find cases of smallpox during their house-to-house visits, they immediately report them to the nearest health authority of the area.

Advisory Committee

To advise the Government of India on all technical and administrative matters pertaining to the implementation of the National Smallpox Eradication Programme, an Advisory Committee, consisting of technical experts drawn from Indian Council of Medical Research, health administrators, epidemiologists and those entrusted with vaccine manufacture, was constituted by the Ministry of Health on 8 June 1962, with the Director-General of Health Services as ex-officio Chairman. All technical difficulties arising in States during the implementation of the programme are referred by the Ministry of Health to this Advisory Committee, for expert advice and guidance. This committee advise after full deliberations at which representatives of international agencies (WHO, U.S. AID and UNICEF, who attend the Advisory Committe's meetings as observers), have made a notable contribution.

Help from International Agencies

The Government of the U.S.S.R. has given an initial free gift of 250 million doses of freeze dried smallpox vaccine, which started arriving in quarterly instalments, from February 1962, and, at the request of the Government of India, has agreed to give a further donation of 200 million doses in monthly instalments of 10 to 11 million doses beginning in January 1964. The World Health Organisation and UNICEF are assisting in the production of freeze-dried vaccine in the country; two Institutes, viz., the State Vaccine Institute, Patwadangar (Uttar Pradesh) and the King Institute, Guindy (Madras), have already been supplied with the necessary equipment for the manufacture of freeze-dried vaccine, and personnel from both Institutes have been trained at the Lister Institute in the manufacturing techniques and in the maintenance of refrigeration equipment. Two more Institutes, viz., the Vaccine Institute, Belgaum and the Institute of Preventive Medicine, Hyderabad, have similarly been selected for the production of freeze-dried vaccine, and personnel from them will be proceeding in March 1964 for necessary training. The Vaccine Institute, Patwadangar, has already produced trial batches conforming to potency to WHO standards.

Our ultimate aim is for each of these four Institutes to be in a position to produce 25 to 30 million doses annually, to meet our needs of 100 to 120 million doses for the maintenance phase of the programme. The Government of India has received a sum of 10 million rupees under P.L. 480 Funds, for the implementation of this national programme.

Based on the article by Dr. K. M. Lal, Dy., D.G.H.S., published in National Smallpox Eradication Programme News Bulletin.

' Smallpox Eradication '

Conclusions and recommendations arising out of the technical discussions held during the Seventeenth Session of the Regional Committee for South-East Asia, September 1964 in New Delhi.

At the seventeenth session of the Regional Committee for South-East Asia, held in New Delhi, from 22 to 28 September 1964, three meetings were devoted to technical discussions on the subject of " Smallpox Eradication." They were held under the Chairmanship of Dr. K. M. Lal (India) with Dr. Ko Ko (Burma) as Rapporteur.

Situation in South-East Asia

In reviewing the smallpox situation in the Region, it was noted that Asia remained the continent reporting the greatest number of smallpox cases and deaths. In the period from 1959 to 1963, Asia had reported from 67.3 per cent (39,221 cases) in 1960 to 81.3 per cent (75,424 cases), in 1963, of the world's total number of cases. As 1963 was expected to be a peak year, according to the cyclical trend shown by the disease in some of the countries in the Region, the increase in the number of cases was not unexpected.

In Mongolia and Ceylon, smallpox was no longer endemic, whilst in Thailand transmission had practically ceased. However, strict surveillance was being maintained to prevent re-introduction.

India reported the largest number of cases. There were 31,052 cases in 1960, 45.95 in 1961, 42,231 in 1962 and 69,768 cases in 1963.

Indonesia reported 7,967 cases and 239 deaths in 1963 and 874 cases and 57 deaths in the first six months of 1964.

In Afghanistan and Nepal, smallpox was endemic, but the reporting system was incomplete.

In Burma, smallpox had been endemic in certain areas before the Second World War, but a downward trend had been noticed since 1950; there were, for example, only 32 cases with one death reported in 1962. There had been an increase, however, in 1963 with 193 cases and 21 deaths.

Periodic vaccination and re-vaccination were being maintained in Ceylon and Mongolia, and an intensified systematic vaccination programme had been in operation in Thailand for a number of years.

A nation-wide eradication programme had been started in India in 1962 and in Afghanistan and Burma in 1964. In Indonesia intensified mass vaccination had been in operation since 1963 in endemic and other neighbouring areas, to be completed by 1965, routine vaccination was continuing in the other parts of the country. In Nepal, a smallpox control pilot project was started in the Kathmandu Valley in early 1962; by March 1964, 70 per cent of the population in the Valley had been vaccinated.

(Detailed plans of the national smallpox eradication or control programmes in respect of Afghanistan, Burma, India, Indonesia and Thailand are contained in the documents submitted during the discussions.)

Epidemiology

The epidemiological aspects of smallpox were discussed, with special reference to the role of factors such as persistence of infection, urban/rural distribution and immunity status, age distribution and seasonal and long-term periodicity.

Regarding the urban/rural distribution, it was brought out that smallpox, although beginning to show an over-all downward trend, persisted longest in overcrowded or newly established areas, such as slums in cities and in suburban areas, areas where there was a to-and-fro migration of labour, and

those difficult of access. The development of better communications and travel facilities to the suburban and urban areas and also between neighbouring countries added an extra link of transference of smallpox within the country and from outside, through the intermingling of population within the country and in inter-country border areas.

Regarding the age distribution, it was found that the age specificity varied according to the immunity status of the various segments of the population. In the absence of any system of reporting of smallpox by age-groups, the data available from the returns of the infectious disease hospitals in India, for example, showed that the largest number of admissions occurred in some cities in the 0–4 age-group, pointing to inadequacy in primary vaccination, whilst in other cities the largest number occurred in the higher age-groups, due to lack of phased re-vaccination activities.

National Eradication Programmes

Planning, Organization and Execution

Important considerations in the different phases of eradication programmes (viz., preparatory phase, attack phase and maintenance phase) were discussed. There were appreciation of and agreement on the guide lines to be taken into consideration in the various phases of organization of the smallpox eradication programme, as contained in document WHO/Smallpox/20, dated 25th May 1964, and in the First Report of the WHO Expert Committee on Smallpox, 1964.

During the preparatory phase, stress was laid on the need for planning and providing for a long-term programme on a national scale, with adequate funds, the existence of well-trained and contented vaccination staff, adequate supervisory staff to check the results of vaccination, mobility of the staff, and the availablity of a potent vaccine with facilities for its proper storage. Steps should be taken towards health

education of the people, in order to enlist their active participation and that of various agencies in the effective implementation of the programme. Even at this stage, information on the social and cultural background of the people, as relating to smallpox, should be collected and utilized for educational purposes.

An analysis of the staffing patterns in the different countries had consistently shown that the tendency was to economize and therefore to understaff the programme. This indicated that, very early in the progress of the programme, it was frequently realized that both the field workers and the supervisory staff should have been much more numerous. It appeared desirable, therefore, to staff the programme adequately from the beginning and later, if necessary, to reduce thus reversing " Parkinson's Law ".

It was realized that the success of the programme would depend on effective administrative machinery along with effective and maximal coverage of all segments of the population with a potent vaccine. In view of the heavy endemicity of smallpox in some countries, 100 per cent successful primary vaccinations should be achieved and as near as possible 100 per cent re-vaccination should be aimed at. In addition to Vaccinators, the need for active involvement of all maternal and child health and other medical services as well as of auxiliary staff was stressed. The educative role of teachers in ensuring that all primary/secondary school students under their charge were successfully vaccinated was realized, and it was felt that, for the success of the programme, their participation should be availed of to the maximum.

Great stress was placed on an independent evaluation of the programme, so that the gaps revealed by such an evaluation might be immediately plugged.

Inter-Country Co-operation

(*a*) In view of the varied and large border areas existing between the countries of the Region, these areas should be given priority for vaccination on an intensified basis and preferably synchronizing such activities. This phase of the programme could be reviewed periodically at inter-country border meetings, which should usefully be organized yearly.

(*b*) Detailed studies of the epidemiological situation of smallpox and of anti-smallpox activities in the various countries of the Region, particularly in border areas, were presented. The value of these studies was evident, and a recommendation was therefore made that an exchange of such information, every six months, among countries of the Region would be of mutual advantage.

(*c*) In view of the efforts at controlling and eradicating smallpox in the Region, it was considered desirable that all countries of the Region co-operate (i) by promptly notifying smallpox cases, even on suspicion, both internationally, and directly, to adjoining countries, and (ii) by taking all practicable measures, to prevent the departure of any infected person or suspect by requiring departing travellers to present a valid international certificate of vaccination or re-vaccination against smallpox as required under Article 30 of the International Sanitary Regulations.

(*d*) The group recognized that freeze-dried vaccine was the vaccine of choice and confirmed that all countries that had embarked on eradication/control programmes were using it whenever possible. In view of the rapid progress of the programmes in these countries, the consumption of freeze-dried vaccine was far in excess of the quantities being kindly donated and therefore the group urged that further quantities of freeze-dried vaccine, as required, should be obtained from donating countries or through WHO during this crucial phase, so that the programmes would not be jeopardized.

Meanwhile, it was noted with satisfaction that four out of the six countries in which smallpox was endemic had made arrangements for the local production of freeze-dried vaccine with WHO/UNICEF assistance. This would, however, take a minimum of two years or more, and international assistance with supplies of freeze-dried vaccine would continue to be needed in this transitional period.

(*e*) As transmission of smallpox had ceased, for all practical purposes, in Ceylon, Mongolia and Thailand, the representatives of these three countries considered it advisable for WHO to arrange for refresher training courses in smallpox diagnosis and epidemiology, particularly for Medical Officers in-charge of infectious disease hospitals and port and airport health service.

Special Consideration In National Programmes

Recording and Reporting of Smallpox

(*a*) The group agreed that, in the mass programmes being carried out, it was essential to maintain continuously the already started census of families, both in the urban and rural areas. This had become an accepted feature in the programme, in which it had become a part of the job specification of the individual vaccinators, in the areas allotted to them, as well as being the responsibility of the inspectorates.

(*b*) The necessity of reporting all smallpox cases including those suspected, within each administrative unit and neighbouring areas as soon as possible was emphasized, in order that the necessary epidemiological investigations and control measures might be started around the cases both at the point of origin and at the point of encounter. As the programme advanced and a large proportion of the population was protected, the reporting of every suspected case at the earliest

possible moment became all the more important. All methods of reporting and notification through all possible agencies should therefore be explored.

(*c*) The need for standard forms for reporting periodically the smallpox situation and vaccination activities as a prerequisite to the above and to assessment was accepted. Suitable forms were discussed and agreed upon.

Vaccination Techniques, Complications and Prevention

(*a*) As mentioned earlier, freeze-dried vaccine was considered the vaccine of choice in smallpox eradication programmes in the countries of this Region. All smallpox personnel, however, would have to be adequately instructed to the effect that even freeze-dried vaccine needs to be kept in suitable storage conditions and that, once the vaccine is distributed, direct sunlight must be avoided.

(*b*) The techniques of vaccination in force in the different countries were reviewed. The method to be followed should be the one that produced the least treauma, such as the multiple pressure technique or the linear scratch. In India, where the rotary lancet method was used, it was considered that the transition from this technique to one of the two other techniques would be gradually carried out. Evidence was produced of the significant advantage of following vaccination in the linear scratch and the rotary lancet techniques with immediate dabbling of the vaccinated place with the vaccine.

(*c*) Satisfaction was expressed that no significant serious complications, in particular post-vaccinal encephalitis, had been reported. In India, out of 273 million vaccinations, for every 13 million vaccinations not more than one post-vaccinal encephalitis like case had been registered. Reference was also made to similar insignificant complications, in the mass vaccination programme carried out in the U.S.S.R. The precaution taken in some of the mass vaccination programmes in the Region whereby one insertion was given in primary

vaccination to children over four years of age was noted. Regarding local reactions, emphasis was placed on the educative role which vaccinators and all concerned could play towards reducing the risk of such complications by observing basic principles of asepsis. There were reports of relatively severe local skin reactions following the use of batches of freeze-dried vaccine. However it was appreciated that, as a result of a collaborative study of vaccinia virus strains used in vaccine production, there were very good prospects that a strain with high antigenicity and minimal reactions would soon be introduced in vaccine production after controlled laboratory and field trials.

Laboratory Diagnosis

Until the load of smallpox infection in countries had been reduced to minimal levels, all cases of suspicious smallpox should be considered as smallpox and necessary action taken accordingly. The value of laboratory diagnostic methods became increasingly great in areas where sporadic cases occurred, and all efforts to make facilities available for these diagnostic methods should be pursued. These methods were discussed at length, but the discussion is not recorded here, since they are described in the First Report of the WHO Expert Committee on smallpox.

Health Education

In planning all phases of programmes is smallpox eradication or control, a survey and study should be made of the people's understanding, attitudes, beliefs and practices with respect to the disease and the measures proposed (i.e., vaccination and re-vaccination) channels of communication among them, available media for publicity and education and the local community organizations which would be available for co-operation with the programme.

The health education objectives should be clearly defined in relation to the programme objectives and operations, and the health education tasks for the various personnel engaged in the programme indicated. All the eradication personnel and others connected directly or indirectly, with the programme should be trained to discharge their educational responsibilities effectively. There should be well trained health educators at appropriate levels, to plan an co-ordinate educational and publicity work, provide adequate supervision to the staff and conduct training programmes.

Integration with Regular Health Services

It was recognized that all task forces engaged in the eradication programme had ultimately, at one stage or other, to be integrated with the basic health services. This would, of course, depend on the degree of development of the basic health services in the respective countries at the time when the programmes were ready for integration. The other alternative would be to continue the task force and gradually build other health services around it.

In countries where National Smallpox Eradication Programmes were in operation, it was considered premature to combine smallpox vaccination with other immunization procedures or other control activities. In countries where smallpox was no longer a major problem the possibility of carrying out simultaneous control activities and/or combined immunizations should be seriously considered (for example, smallpox vaccination combined with BCG and/or other immunization procedures, or with yaws control activities wherever yaws remained endemic).

Administrative Aspects

It was proposed that the maximum utilization of available resources should continue to be made in all the countries with smallpox eradication programmes on a long term basis. As

mentioned earlier the major difficulty referred to was in the supply of freeze-dried vaccine in time as well as in adequate quantities.

Legislation

Although it was agreed that backing legislation should exist, the difficulties of implementing such legislation were realized. However, with continued education greater popular acceptance would be achieved and the need for enforcing legislation reduced. Efforts should be concentrated on obtaining acceptance of vaccination at school entry, on school leaving and at the time of employment.

Evaluation

The subject of evaluation was discussed at great length, and much valuable information exchanged on the lines of experience gained in India and recorded in " A Guide for the Evaluation of the National Smallpox Eradication Programme at District Level ", produced by the Ministry of Health, Government of India.

International Sanitary Regulations

The participants were aware of the views of the WHO Committee on International Quarantine which met in 1964 and of the Expert Committee on Smallpox in regard to possible revision of the International Certificate of Vaccination and Re-vaccination. No comments were made, as Member-Governments would be reporting on this matter to the World Health Assembly.

It was, however, observed that in all the countries of this Region where smallpox was still endemic, freeze-dried vaccine, known to give a high percentage of successful "takes" in re-vaccination, was being utilized as widely as possible. This implied that arrangements and facilities were now available

for all persons contemplating international travel from endemic countries to be vaccinated with freeze-dried smallpox vaccine.

RECOMMENDATIONS

Concept of " Eradication of Smallpox "

The concept of " control ", limited to the protection of a national population and faced with the existence of endemic foci in other countries, required a perpetual and elaborate system of defence education, general vaccination and revaccination, reporting, isolation, quarantine, investigation contact vaccination, international notification, etc. This was the situation in the South-East Asia Region, where smallpox was still endemic in some countries and no longer endemic in others. The realization of a change of concept of " control " to one of "eradication" of smallpox could only come through concerned national action by all countries of the Region. Regional eradication had now become the objective and task which the Region had set for itself, as a follow-up of the resolution of the Eleventh World Health Assembly in 1958 and resolutions of subsequent sessions of the Regional Committee.

In a region where smallpox was heavily endemic and where much movement of population took place, either within or across national boundaries, planning and continued implementation of such programmes on a long-term basis became essential. Whilst it was appreciated that most Governments of the Region had already embarked upon national eradication programmes and had provided for the attack phase to be completed in as short a time as possible, there appeared uniformly to be inadequate provision for the adequate mopping up and maintenance phase on a long-term basis. It was therefore recommended that this should be provided for until

the goal of eradication in the Region was achieved in accordance with the criteria laid down in the report of the WHO Expert Committee on smallpox.

Vaccine Requirements

Some of the countries of the Region had started the production of freeze-dried smallpox vaccine, but it would take a minimum of two years before they could meet their own requirements for the maintenance phase. It was recommended that until such time, WHO should make further endeavours to obtain the necessary supplies from donating countries.

Inter-Country Co-operation

The value of inter-country co-operation was recognized and it was recommended that consideration be given to the synchronization of control measures, organization of inter-country border meetings, exchange of information, promotion of training facilities and co-operation in the spirit of Article 30 of the International Sanitary Regulations.

Uniformity in Terminology

The recommendation of the First WHO Expert Committee on Smallpox in respect of definitions of term used in smallpox eradication programmes were considered practicable and it was recommended that in the Region, the widest distribution of this information be made so as to bring about uniformity in terminology.

Health Education

It was observed that in the various phases of eradication programmes not enough attention had been given to the place and value of health education. It was therefore recommended that the educational aspects of the national smallpox eradication programmes should be planned and implemented, keeping in mind items such as the following:—

(1) Programme objectives for each phase of operation.

(2) Health education objectives (what the people will have to do for implementation of different phases of the programme and after the attack phase).

(3) The health education programme as an integral part of the eradication programme.

(4) Personnel and their health education tasks, to carry out (3) above, specifying who will do what, how, where and when—

(*a*) Administrators and public health administrators.

(*b*) Eradication programme personnel.

(*c*) District and health centre personnel.

(*d*) Community Development and other welfare department personnel.

(*e*) Community leaders, voluntary agencies and local bodies.

(*f*) Members of the medical, teaching and other professions.

Evaluation

The disappearance of the disease is the only final evidence of the success of the programme. Before this is achieved, the evaluation of the programme in the different stages was considered essential for detecting gaps and shortcomings in order to remedy them promptly and thus keep improving the campaign at all times. To reach the final goal of eradication, it was recommended that—

(1) A built-in evaluation of the programme should be made by means of a uniform procedure, as laid down by, and under the direction of the central authority.

(2) This evaluation should be concurrent, consecutive and terminal.

(3) It should have an independent element in the consecutive and terminal operations, whereas the concurrent ones would have to depend entirely on direct supervision of procedures at various stages.

(4) In the absence of any better practicable field method for an immunological appraisal of the herd immunity status at any given point of time, the present available method of challenge vaccination should continue.

(5) The guide lines worked out as a result of evaluations made as part of the Indian National Smallpox Eradication programme should be considered as applicable to countries of the Region.

(6) A terminal evaluation should be made by an independent central organization to determine the readiness or otherwise of an area to enter the maintenance phase of the programme as defined in the First Report of the WHO Expert Committee on Smallpox.

Excerpts from the report of Technical Discussions on Smallpox Eradication.

DO YOU KNOW?

* *Vaccination is a simple, safe and sure method of protection from smallpox.*

* *Vaccination of an infant, for the first time, is called Primary Vaccination.*

* *Vaccination does not cause pain.*

* *If a vesicle develops at the site of vaccination it means that the vaccination has been successful and that it will protect you for three years.*

* *You can get your vaccination, free of cost at the Vaccination Centre, at your home, at your school, when vaccination teams visit your area, at Maternal and Child Health Centres, and at Primary Health Centres.*

N. S. E. P. in Madras State

Smallpox is a disease which is prevalent to a very large extent in our sub-continent. About 90 per cent of the cases of smallpox occuring in this world are reported to occurring only in India and Pakistan. This is entirely a preventible disease and we have got a very potent preventive measure in vaccination.

Though vaccination has been compulsory in our State for over so long yet we have not been able to control the incidence of this disease in our State. This is largely due to (1) lack of knowledge and belief about the efficacy of vaccination and (2) apathy on the part of the public to get themselves vaccinated. (Vaccination confers immunity against smallpox. But this immunity does not last a life time. Vaccination has to be repeated once in 3–5 years at least so that an individual could always be resistant to smallpox. Because this is not so, a large section of the population are susceptible to the infection and it is because of that there is perpetuation of smallpox in our country.) Smallpox was prevalent throughout the world some decades back. But in the more civilised countries they have been able to rid their countries of smallpox by a system of efficient and effective vaccination campaign. So, what is possible in other countries should be possible in our country also and it is with the aim of vaccinating successfully atleast 85 per cent of the total population within a short while. the National Smallpox Eradication Programme has been for the whole of India, was worked out by the Central Expert Committee jointly with the representatives of the State Expert Committees on Smallpox and Cholera in February 1959. In order to estimate the approximate requirements of the State

Smallpox Eradication Programme in respect of manpower, transports and finances, etc., the Committee has recommended the establishment of a pilot project in each State.

In our State the Pilot Project was established in Chingleput dated on 1st September 1960 and the scheme came to end by March 1961. Subsequently North Arcot district was taken up and covered. The National Smallpox Eradication Programme has been extended to the remaining ten districts of this State during 1963–64 and 1964–65 and completed in the districts by February 1965. The programme has been launched in Madras City from 2nd October 1963 and the same is expected to be completed by 30th September 1965.

The Assistant Director of Public Health has been incharge of the programme at the State level. In the districts, the concerned District Health Officers have been vested with responsibility of carrying out the programme in their respective districts. And in the districts the work is carried out in all the Panchayat Unions/Municipalities simultaneously. Additional staff at one Health Inspector for every Panchayat Union and one vaccinator for every 20,000 of the population had been posted to each of the districts taking into consideration the existing number of Health Assistants in each Panchayat Union, Additional vaccinators were also posted to the municipalities at the same rate as for Panchayat Unions. But extra Health Inspectors were not posted for municipalities. The work in municipalities was supervised and verified by the same agency that is normally responsible for these activities. Even though the District Health Officers were made responsible for the execution of the programme in their districts, as they had to devote their time to the other multiferious Public Health activities in the districts, which are themselves enormous and time consuming, they could spare only very little time for the programme. Therefore the progress of the work depended mainly on the Special Health

Inspectors of the Smallpox Eradication Programme and whatever drive could be imparted to the programme by frequent inspections of the Assistant Director of Public Health, National Smallpox Eradication Programme, in the various districts.

The pattern of work adopted under the National Smallpox Eradication Programme during 1963–65 was that the Health Inspector of the (Public Health Council) Panchayat Union is vested with the responsibility of planning the work in his block and the Health Inspector (Smallpox Eradication Programme) is vested with the actual execution of the work through the vaccinators. Each vaccinator is given a target of 500 vaccinations per week of six working days including enumeration. So depending upon the number of vaccinators allotted to the block, the Health Inspector, Panchayat Union works out the actual target of vaccinations that can be turned out by them in one week and divides the population of the block into convenient units that could be covered by the vaccinators weekly. The permanent Health Assistants of the Panchayat Unions are also counted for this purpose and they also work as the vaccinators of the Smallpox Eradication Programme. The vaccinators and Health Inspectors (Smallpox Eradication Programme) stay at the programmed village or group of villages and hamlets for one week and complete atleast 70 to 75 per cent of the targetted coverage, they move on to the next programmed village and after thus completing one round of visits of all the villages in this block, they go for a second round of visits to all the villages and achieve atleast 85 per cent coverage. The verification work is done mostly by the Health Inspector (Smallpox Eradication Programme) but is also shared by the Health Inspector (Public Health Council Panchayat Union). The Health Inspectors and vaccinators have to stay at the villages for the programmed period. This is necessary because the rural population leave the villages early in the mornings and return late in the evenings. To get at them the vaccinators have to start work either early

in the mornings or late in the eveinings. They cannot do this if they stay at the headquarters of the Panchayat Unions. The Health Inspector, Panchayat Union therefore plans the programme, contact the proper people at these villages and arranges for their stay and personal comforts. Statement showing the progress of work done under the Smallpox Eradication Programme in this State during 1963–65 is enclosed.

The Government have been pleased to extend the programme for 1965–66 throughout the State, with a view to bring the total coverage to 100 per cent. While every effort will be made towards achieving the goal, it has to be stated that continuance of the programme for another three years beyond 1965–66 to consolidate the achievement so far gained is very necessary.

(For statement of progress please see next page)

REMEMBER !

* *Vaccination can protect you, your family and the community from smallpox.*

* *Unvaccinated communities become its victims.*

* *Successful vaccination provides immunity against the disease for limited number of years. Hence, periodical re-vaccination after 3 years is necessary.*

* *Infants should be vaccinated within the first three months after birth.*

* *Re- vaccination every three years or earlier in case of an epidemic, will check the spread of the disease.*

* *If all our people undergo vaccination and Periodic Re-vaccination, Smallpox can be eradicated from our country.*

NATIONAL SMALLPOX ERADICATION PROGRAMME—MADRAS STATE.

Progress of work done during the years 1963–65.

Name of the district.	*Population 1961 Census.*	*Number of persons vaccinated.*		*Total.*	*Number verified.*		*Number successfu among verified.*	
		P.Vs.	*R.Vs.*		*P.Vs.*	*R.Vs.*	*P.Vs.*	*R.Vs.*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
South Arcot ..	3,048,000	154,478	2,442,922	2,597,400	114,205	1,347,139	104,082	517,081
Thanjavur ..	3,246,000	178,477	2,452,859	2,631,336	137,979	1,473,558	122,072	555,429
Tiruchirappalli ..	3,190,000	186,518	2,587,655	2,774,173	147,910	1,586,221	133,365	591,707
Madurai	3,211,000	175,337	2,667,490	2,842,827	130,444	1,580,086	114,851	520,581
Ramanathapuram.	2,422,030	157,435	2,080,937	2,238,372	121,535	1,244,270	110,628	462,652
Tirunelveli ..	2,730,000	149,962	2,146,598	2,296,560	78,671	9,27,498	69,751	320,713
Salem	3,804,000	259,762	2,918,035	3,177,797	146,750	1,334,219	129,964	476,107
Coimbatore ..	2,557,000	174,566	2,744,631	2,919,197	121,290	1,606,047	112,599	531,160
Kanyakumari ..	997,000	67,287	785,536	852,823	42,446	3,64,319	35,945	95,226
Nilgiris	409,000	22,558	316,120	338,678	18,957	2,20,853	18,427	86,440
Total ..	26,614,000	1,526,380	21,142,783	22,669,163	1,060,193	11,684,210	951,684	4,157,096

P.Vs.=Primary Vaccinations. R.Vs.=Re-Vaccinations.

Feature Article :

Hæmorrhagic Smallpox

A STUDY OF 240 CASES

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This paper is partly based on the working paper presented by Dr. A. Ramachandra Rao, to the first meeting of the World Health Organization Expert Committee on Smallpox, held at Geneva in January 1964.

—Editor.

It has long been recognised that the hæmorrhagic type of smallpox differs in several respects, epidemiological, clinical, etc., from the non-hæmorrhagic type. As regards the prognosis, this is the most fatal type of smallpox. However, it is known that hæmorrhagic smallpox is not caused by a different strain of virus of variola major. Whenever the source of infection could be traced, it has been found that in a majority of instances, a non-haemorrhagic case was the source for the hæmorrhagic case; and similarly, it is not uncommon to find a hæmorrhagic case producing a non-hæmorrhagic one in close contacts. Why, only certain people should develop this particular fatal variety, is not clearly understood at present.. But it looks as though it is not mere want of immunity that is responsible for the occurrence of this variety; there must be some other factor or factors playing an important role. It is proposed, in this paper, to present only some epidemiological and clinical data from a study of 240 cases of hæmorrhagic smallpox, which will show that there is something unknown which is responsible for the occurrence of this variety.

Curshman (1875) described this condition and classified the cases into two types, viz., ' pupura variola ' and ' variola hæmorrhagica pustulosa '. Some authors doubt whether these two types are distinct from each other, or the difference is only in the degree of severity. Ricketts and Byles (1908) held that this classification was ' arbitrary '. On the other hand, Dixon (1962) does not even recognise the word ' hæmorrhagic ' since, according to him. " while hæmorrhages are features of many types, particularly of the fatal cases, they may also be present in quite mild cases and so have no unqualified prognostic significance ". However, from the experience gained in treating nearly 25,000 cases of smallpox during the last 20 years, it is felt that haemorrhagic smallpox is a separate entity and should be recognised as such.

Material and Method

The subjects of this study were selected from amongst 10,857 cases of smallpox of all varieties admitted to the Infectious Diseases Hospital, Madras, during 55 months ending 30th November 1963. Of these, 240 cases belonged to the hæmorrhagic variety.

Data regarding the occurrence of hæmorrhagic smallpox with reference to various factors like age, sex, vaccinial status, pregnancy, etc., and also some important clinical features are presented.

Before presenting the data certain terms used in this paper require definition—

1. *Hæmorhagic smallpox.*—Cases of smallpox, with hæmorrhages occuring in the skin and/or mucous membrane are considered as hæmorrhagic smallpox. It should be noted that hæmorrhage occuring only into the base of lesions is by itself not a criterion for associated into the hæmorrhagic variety unless it is associated with hæmorrhages into skin and/or mucous membrane.

2. *Hæmorrhagic, early.*—Cases of smallpox where hæmorrahages follow the onset of focal rash, belong to this type which is also termed as type I smallpox.

In some cases focal lesions may not be apparently visible.

3. *Hæmorrhagic, late.*—Cases of smallpox where hæmorrhages follow the onset of focal rash, belong to this type which is also termed as type II smallpox. Hæmorrhages may occur at any stage of the rash.

4. *The unvaccinated* are those (*a*) who were never vaccinated; (*b*) who were said to have been vaccinated, but no scars of vaccination are seen; (*c*) who were vaccinated for the first time during the incubation period of the attack (i.e., 12 to 14 days before the onset of fever).

5. *The vaccinated* are those who have evidence of marks of vaccination done at one time or other during their life time, except those under 4 (*c*) above.

Results of Analysis

Table—1 shows the incience of all types of smallpox along with that of hæmorrhagic smallpox by month and year.

General incience.—Of 10,857 cases of all types of smallpox that were admitted during the period of 55 months beginning from 1st May 1959, 240 belonged to the hæmorrhagic variety with an overall incidence of 2.2 per cent. Of these, 41.7 per cent belonged to type 1 (100) and 58.3 per cent to type 2 (140).

Annual incidence.—The percentage annual incidence of hæmorrhagic smallpox varied from 1.6 to 2.7 from year to year.

Monthly incidence.—The proportionate monthly incidence to the total cases of smallpox varied from month to month with a maxium of 3.4 per cent in February to 1.6 per cent in September. It does not seem to have much relationship even to the total cases of smallpox occurring in each month.

Table—2 shows the incidence of hæmorhagic smallpox cases with reference to the types, vaccinial status, age, and sex.

Incidence and sex.—72 per cent of type I and 55 per cent of type II were females irrespective of age and vaccinial status. It is more predominant in females, especially, in the type I.

Incidence, age and sex.—Irrespective of vaccinial status, 96 per cent of femals and 71 per cent of males of type I, and 84 per cent of females and 78 per cent of males of type II, amongst adults over the age of 15 years.

Incidence with reference to age, sex and vaccinial status.—In general, the proportion of the unvaccinated to the vaccinated was 2 : 3 in type I, and 1 : 1 in type II. 100 per cent of females and 90 per cent of males in the vaccinated and 87 per cent of females and 59 per cent of males in the unvaccinated belonged to the group of adults over 15 years in type I.

97 per cent of females and 87.5 per cent of males in the vaccinated, and 68 per cent of females and 68 per cent of males in the unvaccinated, belonged to adults above 15 years in type II.

Table 3 shows the distribution of hæmorrhagic smallpox cases among males, and non-pregnant and pregnant females in all age groups. It also shows that of the hæmorrhagic smallpox cases in the age group 16–45, 30.6 per cent were pregnant, and with reference to types, 50.5 per cent of type I and 14 per cent of type II were pregnant. Further, the proportion of males to non-pregnant and pregnant females is 2 : 3 : 5 in type I and 5 : 4 : 1 in type II.

Table 4 shows the nature of hæmorhages occurring in the two types of cases, in percentages.

TABLE 1.

Statement showing the Incidence of all types of Smallpox and of Haemorrhagic Smallpox by month and year.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October	November.	December.	Total.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
1959	..	..	..	..	113	77	114	277	284	201	115	135	1,316
					2	*1*	*6*	*8*	*7*	*2*	*4*	*3*	*33*
1960	164	247	227	208	116	147	246	154	188	171	99	210	2,171
	3	*5*	*5*	*6*	*5*	*1*	(—)	*1*	(—)	*3*	*3*	*3*	*36*
1961	301	423	655	621	391	336	314	190	139	93	51	152	3,666
	6	*19*	*12*	*8*	*3*	*10*	*4*	*2*	*4*	*2*	*1*	*4*	*75*
1962	216	277	160	153	106	62	81	101	72	42	69	123	1,462
	7	*5*	*3*	*9*	*2*	*1*	*2*	*1*	(—)	*2*	*1*	*3*	*36*
1963	119	166	187	104	143	140	318	320	306	26	172	..	2,236
	6	*9*	*5*	*4*	*3*	*2*	*7*	*11*	*5*	*5*	*3*		*60*
Total	800	1113	1229	1086	869	762	1073	1042	989	768	506	620	10,857
	22	*38*	*26*	*27*	*15*	*15*	*19*	*23*	*16*	*14*	*12*	*13*	*240*
Mean	200	278	307	271	174	152	215	208	193	154	101	155	2,171
	5·5	*9·5*	*6·5*	*6·8*	*3·0*	*3·0*	*3·8*	*4·6*	*3·2*	*2·8*	*2.4*	*3·2*	*48*
Percentage incidence of Haemorrhagic variety to total cases.													
	2·8	3·4	2,1	2·5	1·7	2·0	1·8	2·2	1·6	1·8	2·4	2·1	2·2

N.B.—Figures in italics indicate number of cases of haemorrhagic smallpox.

Table 2.

Statement showing the incidence of Haemorrhagic Smallpox Cases with reference to the Type, Vaccinial Status, Age and Sex.

Age group (years).	Haemorrhagic, early—Type I. Males. Unvaccinated.	Males. Vaccinated.	Males. Total.	Females. Unvaccinated.	Females. Vaccinated.	Females. Total.	Total. Unvaccinated.	Total. Vaccinated.	Total. Total.	Haemorrhagic, late—Type II. Males. Unvaccinated	Males. Vaccinated.	Males. Total.	Females. Unvaccinated.	Females. Vaccinated.	Females. Total.	Total. Unvaccinated.	Total. Vaccinated.	Total. Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
Below 1	1	..	1	..	..	..	1	..	1	2	..	2	1	..	1	3	..	3
1– 5	4	1	5	1	..	1	5	1	6	5	1	6	6	..	6	11	1	12
6–10	1	..	1	2	..	2	3	..	3	3	2	5	4	1	5	7	3	10
11–15	1	..	1	..	..	..	1	..	1	1	1	5	..	..	..	1	1	2
16–20	..	3	3	3	10	13	3	13	16	3	3	6	5	5	10	8	8	16
21–25	6	4	10	2	16	24	14	20	34	5	8	13	6	13	19	11	21	32
26–30	2	3	5	3	12	15	5	15	20	4	8	12	6	8	14	10	16	26
31–35	2	..	2	3	9	12	5	9	14	1	4	5	2	3	5	3	7	10
36–40		..	..	1	1	2	1	1	2	3	3	6	1	6	7	4	9	13
41–45	..	..	..	..	1	1	..	1	1	4	..	4	1	..	1	5	..	5
46–50	..	..	..	..	..	..	..	..	..	4	1	5	1	1	2	5	2	7
51–55	..	..	..	..	..	..	..	..	..	..	1	1	1	1	2	1	2	3
56 and over	..	..	..	2	..	2	2	..	2	..	..	..	1	..	1	1	..	1
Total	17	11	28	23	49	72	40	60	100	35	32	67	35	38	73	70	70	140

TABLE 34

Statement showing Distribution of Haemorrhagic Smallpox Cases between Males, Non-pregnant and Pregnant Females in all age groups.

Age groups (years).	Males.			Females (non-pregnant).			Females (pregnant).			Total.		
	Unvaccinated.	*Vaccinated.*	*Total.*	*Unvaccinated.*	*Vaccinated.*	*Total.*	*Unvaccinated.*	*Vaccinated.*	*Total.*	*Unvaccinated.*	*Vaccinated.*	*Total.*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Type I—Haemorrhagic, early—												
Below 15 ..	7	1	8	3	..	3	..	..	..	10	1	11
16 to 45 ..	10	10	20	7	16	23	11	33	44	28	59	87
Above 45 ..	..	..	..	2	..	2	..	..	..	2	..	2
Total ..	17	11	28	12	16	28	11	33	44	40	60	100
Type II—Haemorrhagic, late—												
Below 15 ..	11	4	15	11	1	12	..	..	..	22	5	27
16 to 45 ..	20	26	46	17	25	42	4	10	14	41	61	102
Above 45 ..	4	2	6	3	2	5	..	..	..	7	4	11
Total ..	35	32	67	31	28	59	4	10	14	70	70	140

Type I and II—Haemorrhagic, total—

Below 15 ..	18	5	23	14	1	15	—	..	..	32	6	38
16 to 45 ..	30	36	66	24	41	65	15	43	58	69	120	189
Above 45 ..	4	2	6	5	2	7	—	..	—	9	4	13
Total ..	52	43	95	43	44	87	15	43	58	110	130	240

TABLE 4

Statement showing nature of Haemorrhages occurring in the two Types of Cases (in per cent).

Type.	*Skin.*	*Subconjunctival.*	*Haematuria.*	*Gums.*	*Bases of lesions.*	*Haemopytsis.*	*Melæna.*	*Epistaxis.*	*Haematemesis.*	*Vaginal.*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Type I (100 cases)	86	66	26	22	20	15	10	2	2	80
Type II (140 cases)	18	55	30	30	36	30	10	3	3	58

Clinical Data

The clinical features of hæmorrhagic smallpox are well known. In type, I, prodromal symptoms are very severe and prolonged, and the cases may die even before the exanthem is frankly seen. The high toxicity, severe head-ache, excruciating backache, heaviness in the chest, flushed appearance of the whole body, hæmorrhages into skin and mucous membranes, anxious and pale look, restlessness, and appearance of a few abortive papules here and there on 4th or 5th day of fever, the velvety touch and colour in late stages, sense of impending death, and the sudden end are characteristics of type I.

In type II, the prodromata may or may not be severe but the constitutional symptoms will drag on even after the onset of exanthem, and in the majority of cases the lesions show hæmorrhages into their bases and flatten out, with hæmorrhages appearing into the various mucous membranes Evolution of rash usually stops after papulovesicular stage and the case becomes more and more toxic, and death may occur between 8th and 12th days of disease in fatal cases.

Tables 1 to 4 show the incidence of different forms of hæmorrhages in the two types of cases.

Prognosis

Type I was 100 per cent fatal, and none survived an attack. In type II, there were 11 survivals out of 140 cases, with a fatality rate of 92 per cent. There were more survivals in the vaccinated than in the unvaccinated group. The mean day of death in type I was 5·95 and in type II was 10·2.

Discussion

In general about 1 per cent of the total cases were early hæmorrhagic and about 1·5 per cent were late hæmorrhagic. There does not seem to be much consistency either in the annual or monthly incidence though usually the highest proportionate incidence is in February and the lowest in September.

The hæmorrhagic early type or type I is more common in adults. In an analysis of about 3,400 non-hæmorrhagic smallpox cases (not yet published) it was found that about 80 per cent of the unvaccinated and about 9 per cent of the vaccinated cases were under the age of 10 years. Compared to this in type I hæmorrhagic smallpox, the corresponding figures were only 25 per cent and 1.6 per cent in the age-group under 15 years. Thus the disease is far more common in adults even in the unvaccinated.

Nearly 75 per cent of this type of hæmorrhagic smallpox were females. Fifty per cent of the total cases and 66 per cent of female cases were pregnant. Rao *et al.* (1963) have shown that in non-hæmorrhagic smallpox only 9 per cent were pregnant and also described the proportionate distribution of non-hæmorrhagic smallpox cases between males, non-pregnant females and the pregnant in the age-group 16–45 as 5 :4 : 1, whereas we find in type I hæmorrhagic smallpox the corresponding figures for the same age-group are 2 : 3 : 5. So there is no doubt that the pregnant subjects are more susceptible to type I smallpox.

Suppose we exclude the pregnant women and see whether this particular type is really more common in adults and whether the high incidence of pregnant cases in this type has marked the true picture. Even then we find nearly 35 per cent of the unvaccinated and about 4 per cent of the vaccinated in this type have occurred in children under 15 years as against 80 per cent and 9 per cent in the non-hæmorrhagic cases under 10 years.

Rao *et al.* (1963) have also discussed some possible causes for this increased incidence of severe varieties of smallpox including the hæmorrhagic in the pregnant and indicated whether it may be possibly due to some hormonal distur bances especially the high levels of circulating steroid hormones.

The exact cause of death in hæmorrhagic smallpox also is not known for definite. But it is presumed that mere loss of blood by itself may not be the cause of death. It is proved that these cases have intense and continuous viræmia till almost the day of death unlike what obtains in non-hæmorrhagic smallpox. Hence whether death could be due to the viræmia or virus toxæmia (if virus had toxins) is a problem that requires further elucidation.

Work is also under progress as regards the investigations into other possible factors like defective blood coagulation, defective antibody formation mechanism, etc., in the type-causation.

However, from the above data it appears that the hæmorrhagic early type is quite different from the non-hæmorrhagic, both epidemiologically and clinically. It has a different age-sex distribution pattern, and mere want of immunity is not the answer to its causation. Further, the mortality in these cases, whether in the vaccinated or in the revaccinated, is 100 per cent.

There is a lot of controversy whether the hæmorrhagic late type is hæmorrhagic type at all or this is only a very severe form of non-hæmorrhagic smallpox complicated with hæmorrhages. This study reveals that this type II has more common features with type I than with non hæmorrhagic varieties.

Firstly, the mortality rate is 90 per cent even in the vaccinated, whereas in the non-hæmorrhagic in the once-vaccinated the case fatality rate is only 2 to 5 per cent.

Secondly, 31 per cent of the unvaccinated and 7 per cent of the vaccinated cases of this type II are under the age of 15 years as against 80 per cent and 9 per cent in the non-hæmorrhagic under 10 years group.

Even after excluding the pregnant subjects, the age incidence is 33.3 per cent of the unvaccinated and 8.3 per cent of the vaccinated of this type in the group under 15 years.

Thirdly, 14 per cent of the total cases and 27 per cent of the total female cases in the age-group 16.45 were pregnant as compared to only 9 per cent in the non-hæmorrhagic of the same age-group.

But unlike type I, there is no greater incidence of this type in females, the proportion being 1 : 1 and also the proportionate distribution between males, non-pregnant females and pregnant females in the age-group 16—45 is 5 : 4 : 1—the same as in non-hæmorrhagic smallpox. This is the only thing which is at variance with type I.

Thus we find even type II hæmorrhagic smallpox has more features common with the type I, in that it has similar type of age distribution and the pregnant are more vulnerable though not to the same extent as type I and so both have to be considered as separate entities and perhaps type II is less severe form of type I, rather than a more severe form of non-hæmorrhagic smallpox.

Conclusion

Both from epidemiological and clinical points of view, hæmorrhagic variety of smallpox has to be considered as a separate entity from the non-hæmorrhagic, and it is not merely a severe variety of smallpox which is invariably fatal.

From the evidence available it looks that it is not the want of immunity alone that is responsible for the occurrence of this variety of smallpox. Hormonal disturbances, defective antibody mechanism, intense viræmia, virus toxæmia, blood coagulation defects and some other factors unknown at present may be responsible for the occurrence of this variety of smallpox which requires further study.

The present study only reveals that adults are more likely to get this than children and women, especially pregnant women are more susceptible than men.

Summary

Epidemiological and clinical data of 240 consecutive admissions of hæmorrhagic smallpox cases into the I.D. Hospital between May 1, 1959 to November 30, 1963 are presented.

The overall incidence is about 2.2 per cent of the total smallpox admissions and the proportionate incidence varies from month to month with a maximum in February and minimum in September.

Two types of this variety are described, viz., hæmorrhagic early, and hæmorrhagic late.

Type I in haemorrhagic early variety is far more common in females.

The disease mostly occurs in adults.

Vaccination does not seem to offer the same protection as it does for the non-hæmorrhagic varieties, since it is rather rare in the unvaccinated children under 5 years.

The pregnant subjects seem to have special predilection for this variety, especially type I.

Type I is 100 per cent fatal; and type II is 92 per cent fatal.

Arguments are put forward to show that the hæmorrhagic variety is a definite clinical entity different from the non-hæmorrhagic varieties, and there may be some host factor peculiar to adults, especially the pregnant women, which may be playing a role in the causation of this variety.

The Work of WHO in 1964

Communicable Diseases

In his annual report to the Assembly, Dr. Candau points out that the scourges of the past are still daily realities, in spite of general opinion to the contrary. The incidence of plague is increasing in certain areas: cholera has taken the lives of thousands in recent years; smallpox continues to be a major hazard with tens of thousands of cases a year; malaria is far from eradicated; tuberculosis remains one of the most widespread infectious diseases; there has been an upsurge of syphilis and gonorrhoea; yaws still constitutes a major public health hazard in many parts of the tropical and sub-tropical belts; gastro-intestinal disorders are among the main causes of sickness and death, especially of infants and children.

Malaria

Much progress has been made, however. The world-wide malaria eradication campaign continues to advance; of the estimated 1,560 millions in the originally malarious areas of the world from which information is available, 1,168 millions (75 per cent) live in territories from which malaria has been eradicated or where eradication programmes are in progress. In India the transmission of malaria has been stopped in new areas inhabited by tens of millions and a total of 70 per cent of the country's population lives in areas that have reached this, the consolidation stage. The whole of Ceylon is also at this stage as are areas in Indonesia, inhabited by 18 million people.

Smallpox

Smallpox decreased in South America where nation-wide programmes are being pursued. There are extensive vaccination programmes in India, Afghanistan and Burma. Assistance is being given to countries in West Africa to start eradication campaigns.

Tuberculosis

Progress against tuberculosis is slow and the disease still claims about three million lives a year; at least 15 million people have infectious tuberculosis. WHO is helping 39 countries to assess the extent of their TB problem, to plan national programmes against the disease and to train personnel.

Research

Over 100 new research projects have been started with WHO collaboration. Subjects include cancer, cardiovascular diseases, nutrition, immunology, environmental health. malaria and other communicable diseases.

Cancer

Seven International WHO centres and 58 collaborating centres are at work on the task of classifying the many forms of cancer-charting them, identifying them and seeking internationally acceptable names for them. WHO also is stimulating and supporting research on a number of animal cancers that may throw light on human cancer.

Measles

Results are being analysed of trials of measles vaccines in Canada, Czechoslovakia, Nigeria, Switzerland, USSR, and Yugoslavia, to compare the severity of reactions and the degree of protection given by several different vaccines.

Trachoma

In spite of years of effort, attempts to produce a vaccine against this infectious eye disease have not been entirely satisfactory though field trials are encouraging. Antibiotics are still the main weapon and 16 countries received WHO assistance in 1964 in the control of trachoma.

Polio

Paralytic polio has reached very low levels where successful mass vaccination campaigns have been carried out, but the infection continues to smoulder in most countries.

Water

In 1964, over 70 countries received assistance from WHO in 114 projects which are helping to improve community water supplies.

Education

Over 2,400 fellowships were awarded by WHO in 1964 to enable health personnel to acquire essential knowledge and experience not available in their own countries. This brings the total number of such fellowships awarded since the Organization began to nearly 20,000.

Nursing

A WHO study revealed that there is steady improvement in the standard of nursing education around the world; educational requirements for admission are higher, teaching staff better prepared and facilities for practical instruction have been improved.

Technical discussions :

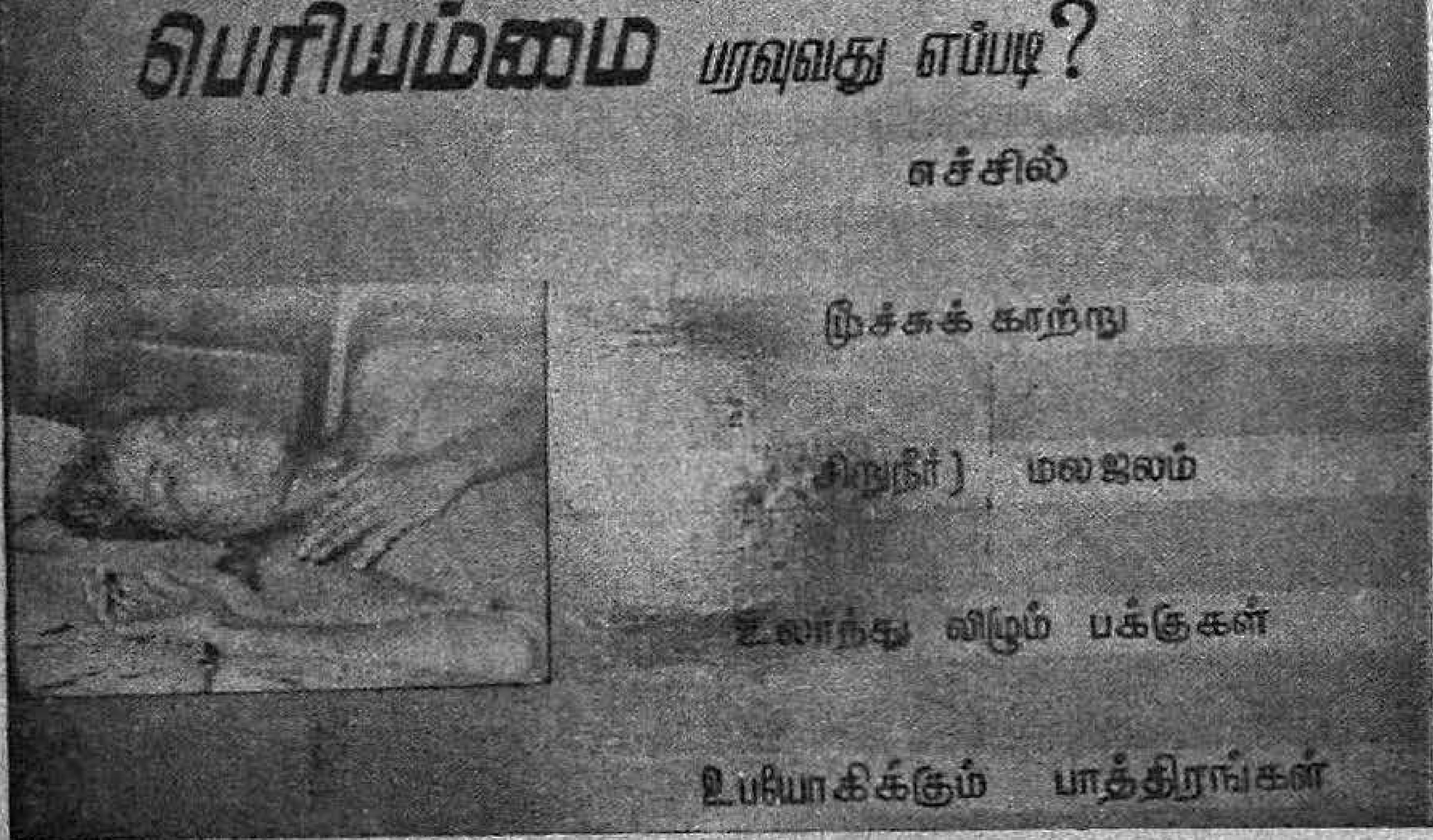
During the Assembly, technical discussions will be held on "Health Planning" a subject of importance for all countries, especially the young nations. May factors are responsible for the current interest in health planning, among them population growth, migrations, and increases in the number of old people in the community and of young people seeking education and employment. Modern discoveries in medical science and the development of new medical and surgical techniques have also brought a realization that many of the old health techniques have outlived their usefulness, and have drawn attention to the need for planning or replanning.

Smallpox Eradication in the Exhibition

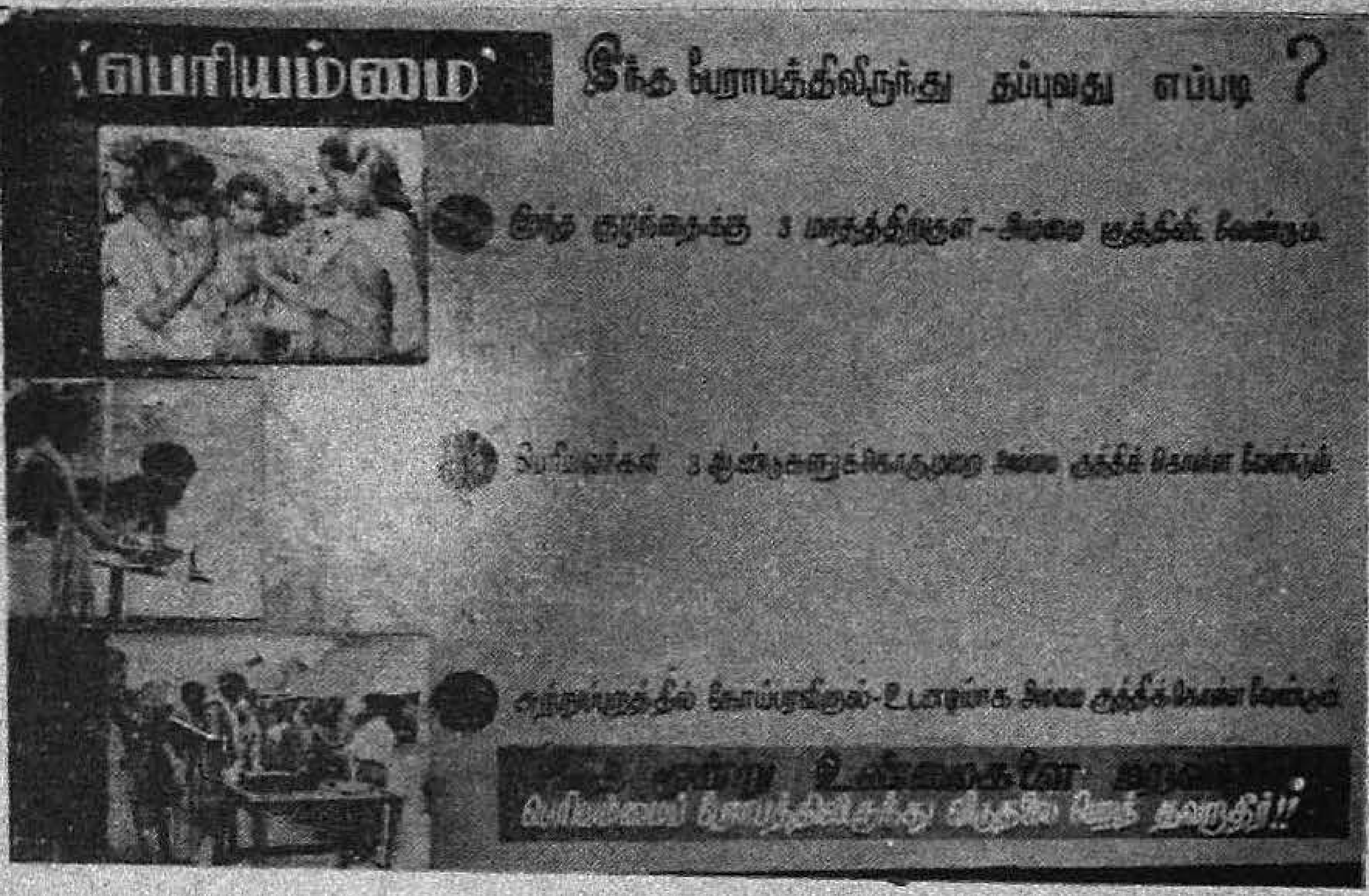
State Health Edueation Bureau took part in All-India Khadi Swadesi and Industrial Exhibition, held during December 1964—January 1965 at Teynampet, Madras, and developed a Health Pavilion in which panels and exhibits on He lth Education on Smallpox form the vital part. Photos show, a few Panels on Smallpox Eradication, prepared in the workshop of Health Education Bureau and displayed in the pavilion :—

Panel depicts an appeal of our late Prime Minister Shri. Jawaharlal Nehru, to support the Vaccination Campaign.

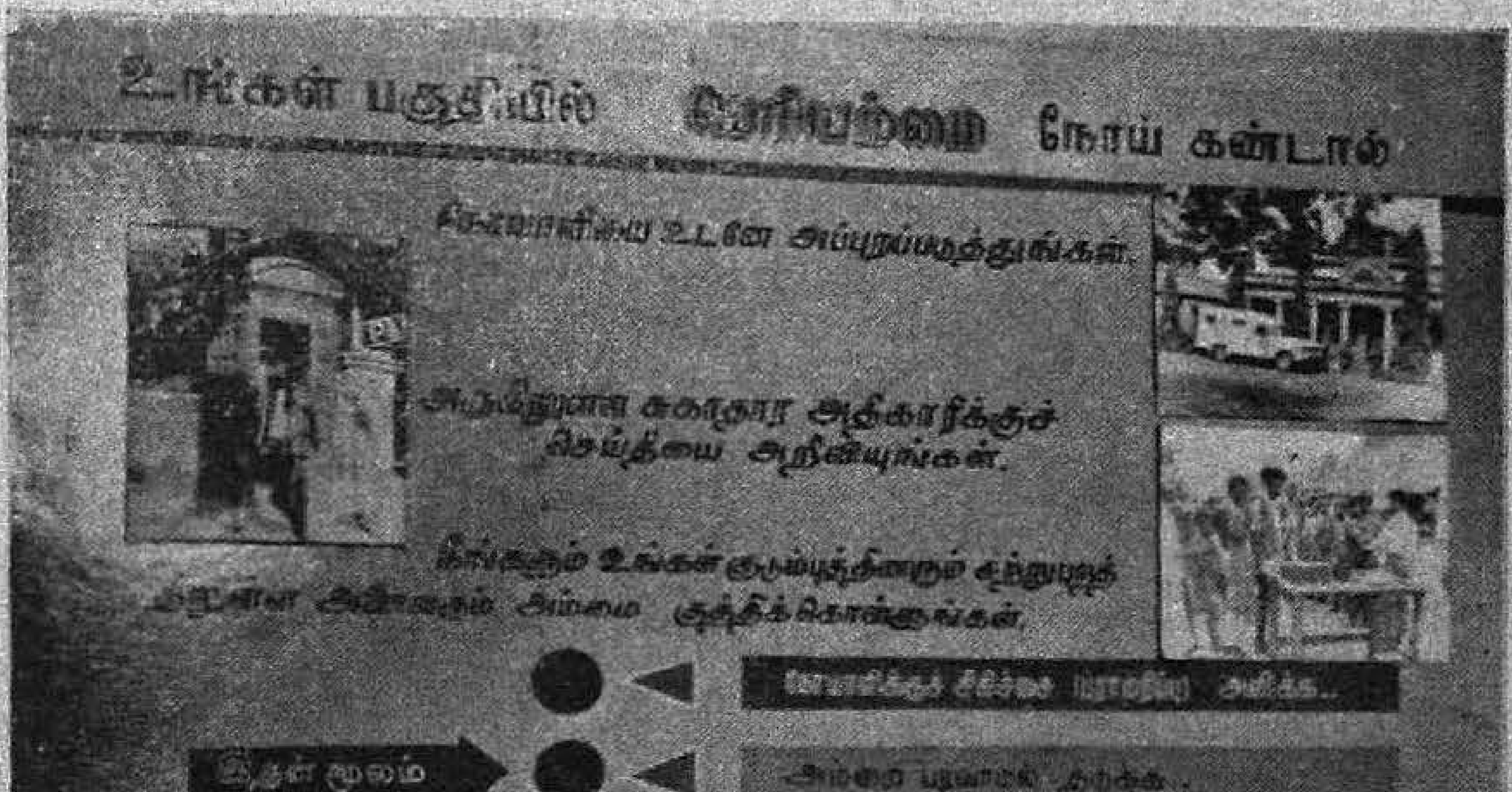
Before Fifty years smallpox was the world-wide health problem.
Now, only S E· Asia is the source of infection.



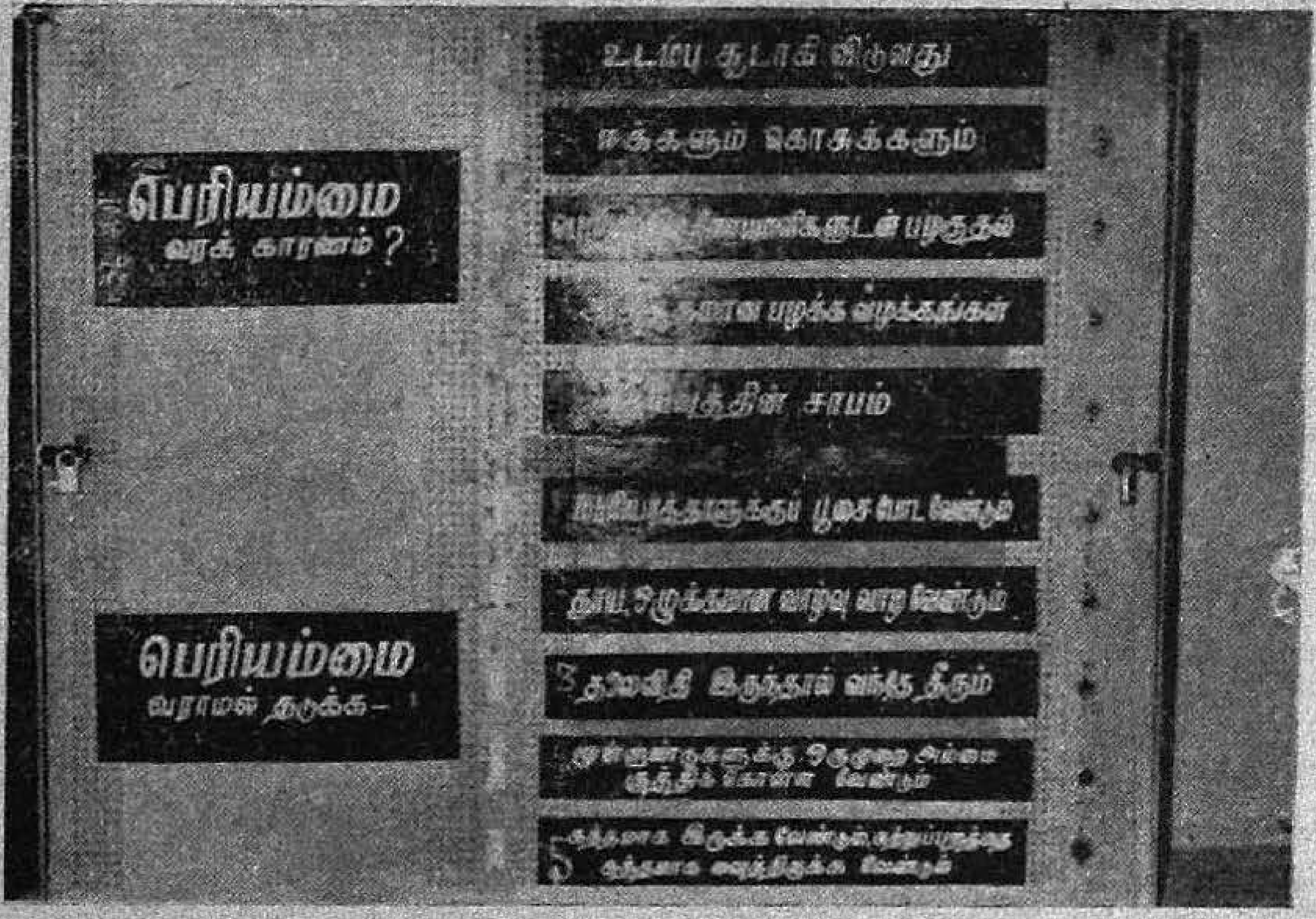
The carriers of the smallpox virus.



Vaccination is the only safe and sure method of protection from Smallpox.



,‘ What to do when Smallpox occurs in a localify ? ”. The answer is given in this panel.



This is the front elevation of the " Weeders Counter " designed, and prepared in our Bureau and displayed in the exhibition, to conduct a simple study on the knowledge of people about Smallpox.

VACCINATION

THE SIMPLE AND

THE SAFE METHOD

TO

PROTECT YOUR CHILD

FROM SMALLPOX